



## "EGG"-CEPTIONAL SUCCESS FOR AVIAN FACILITY ON ISS

### Why is it important?

Over the decades since the first space flight, researchers have discovered that a low-gravity environment has multiple and variable effects on the human body. Because relatively few humans are exposed to a microgravity environment, researchers often use animal models to obtain useful data that can be applied to human problems. One key area of interest is how microgravity affects normal development.

### What is NASA doing?

The Avian Development Facility (ADF) was designed to incubate up to 36 Japanese quail eggs, 18 in microgravity and 18 in artificial gravity, so that the two sets of eggs are exposed to otherwise identical conditions, the first time this has been accomplished in space. Eggs are preserved at intervals to provide snapshots of their development for later analysis. Quails incubate in just 15 days, so they are an ideal species to be studied within the duration of Space Shuttle missions. Further, several investigators can use the same specimens.

The ADF originated in NASA's Shuttle Student Involvement program in the 1980s and was developed under the NASA Small Business Innovation Research program. In late 2001, the ADF made its first flight and carried eggs used in two investigations:

- development and function of the inner-ear balance system in normal and altered gravity environments and
- skeletal development in embryonic quail.

### What are the benefits?

Bones from the quail eggs are being analyzed for changes in mineralization, cell cycle timing, collagen synthesis, rate of bone formation, and the conversion of cartilage to bone during development. The ears are being analyzed to determine whether microgravity affects the development of the balance organs and what changes may take place in how they connect to the nervous system. The results from both studies should yield fundamental insights into basic animal development.

### What is next?

Investigations with the ADF specimens continue. The ADF itself is now flight-qualified hardware available to support future investigations on the Space Shuttle or the ISS. With minor modifications, it can also support research on insects, plants, and fish.

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Quail eggs are small (shown above at actual size) and develop quickly, making them ideal for space experiments. The Avian Development Facility supports 36 eggs in two carousels (below), one of which rotates to provide a 1-g control sample for comparing to eggs grown in microgravity.

